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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/049,615	02/21/2002	Hiroshi Yoshida	011362	2567
23850	7590	11/19/2003		
ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP 1725 K STREET, NW SUITE 1000 WASHINGTON, DC 20006				
			EXAMINER SONG, MATTHEW J	
			ART UNIT 1765	PAPER NUMBER

DATE MAILED: 11/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/049,615	Applicant(s) YOSHIDA ET AL.	
	Examiner Matthew J Song	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 rejected under 35 U.S.C. 102(b) as being anticipated by Yoon et al (US 5,368,764).

Yoon et al discloses Mn-Zn single crystal ferrite compound, where the composition contains a host material essentially consisting of 51 to 54 mole % Fe_2O_3 , 27 to 33 mole % MnO and 16 to 20 mole % ZnO and an additional material essentially consisting of 0.2 to 2 mole % SnO_2 , 0.1 to 1 mole % CoO , 0.2 to 1 mole % CaCO_3 and 0.02 to 1 weight % V_2O_5 (col 3, ln 50 to col 4, ln 67). Ca and V are well-known p-type dopants for ZnO .

3. Claims 1 rejected under 35 U.S.C. 102(b) as being anticipated by Nishiyama et al (US 4,174,421).

Nishiyama et al discloses a crystalline zinc oxide film containing vanadium and manganese together with or without copper (abstract). Nishiyama et al also discloses the content of vanadium and manganese in the ZnO film is 0.01 to 20.0 atomic percent (claim 1). Cu and V are well-known p-type dopants for ZnO . Nishiyama et al is silent the ZnO film being a ferromagnetic p-type ZnO material, however this is inherent to Nishiyama et al. Nishiyama et al discloses a ZnO material containing similar dopants, as applicant, therefore a similar material will inherently have similar properties.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoon et al (US 5,368,764) or Nishiyama et al (US 4,174,421) in view of Yamamoto et al ("Solution Using a Codoping Method to Unipolarity for the Fabrication of p-type ZnO").

Yoon et al or Nishiyama et al teaches all of the limitations of claim 2, as discussed previously, except a zinc oxide including a n-type dopant.

In a method of codoping ZnO, note entire reference, Yamamoto et al teaches codoping ZnO with a p-type dopant and a n-type dopant to form p-type ZnO: (Al, 2N), this reads on applicant's p-type dopant with a higher concentration than a n-type dopant, and simultaneous codoping decreases the Madelung energy of p-type doped ZnO with p-type ZnO doped with a N acceptor alone (pg 168 and Fig 3). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Yoon et al or Nishiyama et al with Yamamoto et al's codoping with p-type and n-type dopants to lower the resistivity.

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoon et al (US 5,368,764) or Nishiyama et al (US 4,174,421) in view of Schetzina (US 5,679,965).

Yoon et al or Nishiyama et al teaches all of the limitations of claim 3, as discussed previously, except the method of fabricating ZnO in which an atomic gas from a solid-state source of Zn or Zn oxide and an activated oxygen are supplied onto a semiconductor substrate to grow a single crystal zinc oxide thin film on the substrate, an atomic p-type dopant and an atomic Mn are supplied all together onto a substrate

In a method of forming ZnO by Molecular beam epitaxy (MBE), Schetzina teaches a MBE source for molecular zinc of zinc metal and an oxygen plasma source and additional source ports can be added to the system for MBE deposition of other materials including dopants for deposition of ZnO on a substrate (col 20, ln 55 to col, 21, ln 67). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Yoon et al or Nishiyama et al with Schetzina's method of forming ZnO by MBE to form a high quality ZnO (col 19, ln 1 to col 20, ln 20).

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoon et al (US 5,368,764) or Nishiyama et al (US 4,174,421) in view of Schetzina (US 5,679,965) as applied to claim 3 above, and further in view of Yamamoto et al ("Solution Using a Codoping Method to Unipolarity for the Fabrication of p-type ZnO").

The combination of Yoon et al and Schetzina or the combination of Nishiyama et al and Schetzina teach all of the limitations of claim 4, as discussed previously, except the n-type dopant is doped so as to provide a higher concentration of the p-type dopant than that of the n-type dopant.

Yamamoto et al teaches codoping ZnO with p-type dopant and n-type dopants and p-type ZnO: (Al, 2N), this reads on applicant's p-type dopant with a higher concentration than a n-type dopant, and simultaneous codoping decreases the Madelung energy of p-type doped ZnO with p-type ZnO doped with a N acceptor alone (pg 168 and Fig 3). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Yoon et al and Schetzina or the combination of Nishiyama et al and Schetzina with Yamamoto et al's codoping with Al,2N to fabricate a low resistivity p-type ZnO crystals.

Response to Arguments

8. Applicant's arguments filed 8/12/2003 have been fully considered but they are not persuasive.

The double patenting rejection over 09/696,013 has been withdrawn because claims, which the rejection was based have been canceled in the co-pending application.

Applicant's argument that Ca, V and Cu are not p-type dopants of ZnO is noted but is not found persuasive. The Examiner maintains that Ca, V and Cu are well known p-types dopants for ZnO, which is evidenced by White et al (US 6,291,085), note column 4, lines 5-20.

Applicant's argument that Ca, V and Cu are not p-type dopants for ZnO is noted but is not found persuasive. This argument is a mere attorney allegation without evidence; therefore is not found persuasive. The Examiner's position that Ca, V and Cu are p-type dopants for ZnO is evidenced by White et al (US 6,291,085), which was cited by the Examiner, previously.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., C (Group IV

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element and N (Group V element) are p-type dopants) are not recited in the rejected claim(s).

Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., B, Al, In, Ga (Group III elements), Zn (group II element) and H (Group I) element are n-type dopants) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

White et al (US 6,291,085) teaches a method of growing p-type ZnO, where Ca, Cu and V are suitable dopants (col 4, ln 1-25).

Bhargava et al (US 6,300,640) teaches a ZnO host material doped with manganese (col 9, ln 1-15).

Asai et al (US 5,393,444) teaches doping a ZnO single crystal with Li or a trivalent metal, such as Aluminum (Abstract and col 10, ln 25-35).

Iimura et al (JP 56-063900) teaches a single crystal ferrite comprising manganese oxide and zinc oxide, which is used as a magnetic head material (Abstract).

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

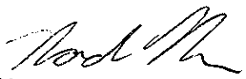
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Song whose telephone number is 703-305-4953. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 703-305-2667. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Matthew J Song
Examiner
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NADINE G. NORTON
PRIMARY EXAMINER

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